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American Architects.

From a very interesting paper "On the Conditions and Prospects of Architecture in the United States" by Wm. Fogerty, Fellow of the Royal Institute of British Architects, published in the January number of *Van Nostrand's Engineering Magazine*, we make the following extract:

"It is not possible in the limits prescribed for such a paper as this to do more than glance at some of the most prominent of each class of buildings, and I will now proceed to a few remarks on the condition of the profession. It is not by any means as flourishing as the large amount of building doing in the country would lead one to expect. Nevertheless, there are in each large city a number of very successful practioners, and there is no reason to doubt but that the number will increase according as the American public begins better to understand and appreciate architects and their art. The architects themselves have much to do to diffuse a wider knowledge on the subject, and also, as I have endeavored to show in my previous paper, much to improve in the style of their practice. At present—no matter how lavishly money may be expended in brick, granite, marble, wood or iron amounting, as will be seen, to four or five times the sums expended on similar buildings in the old country—the American public seems ts have little confidence in its architects, and seems disposed to employ and remunerate them only on the most limited scale. What stronger instance of this could we have than that of the architect to the United States Treasury, who, while planning buildings that cost from ten to twenty millions of dollars annually, receives but 4,000 dollars a year himself, or about three times the pay of a bricklayer in the same country? The gentleman already referred to—who filled that office for eight years, and displayed no ordinary ability in the conduct of the vast work entrusted to him—has, it is said in the papers, retired comparatively a poor man, nor has there been any allusion to a pension. Architects in private practice can do much better, of course; but the disposition is very much, as in the case mentioned, to do without them if possible, and even when they are employed, to limit their functions to the supply of the necessary drawings—the superintendence, adjustment of accounts, &c., being placed in other hands. The American public cannot, however, be blamed for this, when the profession itself neglects these two important branches of its duty. It has been credibly stated of a well-known New York architect that, when asked by his client how much the brickwork of a building would cost, remarked that "he had not the least idea, as he really did not know how bricks were sold, whether by the pound or otherwise." No wonder if after this, clients conclude that architects are only fit for drawing pretty pictures, and feel disposed to get rid of the architect once the drawings are prepared, or else place the next monster hotel or warehouse wholly in the hands of some so-called "practical man" as in the cases already alluded to.

"The neglect of the financial element in their practice by American architects recently called down on the profession a severe rebuke from the late Governor of the State of New York, who, in his message to the Legislature, drew attention to the fact that State buildings had cost on an average about four times the amount of the architects' estimates. In consequence of this alarming discrepancy he recommended that in future the architect should only be employed to furnish the drawings and that when once these were obtained a builder should be employed to superintend the work, including the adjustments of estimates, contracts and accounts, This is simply carrying out by the State the same principle which so generally prevails in private practice, and considering architects as mere draughtsmen, unfit to be trusted with anything beyond the limits of their drawing board. In fact the very word is misunderstood, and whenever a member of the craft wishes to let the public know that he is anything more than a draughtsman ,he has to advertise himself as "architect and superintendent of works," as if the former did not necessarily imply the latter.

"Among the most obvious wants in America is a weekly journal devoted to the interests of the architectural and building public. In a country where journalism in all other departments is so fully worked, there seems every reason to anticipate success for one such. At present the English building journals circulate largely, but they can neither give local news nor be desirable media for trade advertisements. There is a monthly journal called the *American Builder*, very good of its class, but once a month is not often enough either for news or advertisements."

The want of a weekly paper devoted to the interests of American architects, referred to by Mr. Fogerty, is now well supplied by the *American Architect and Building News* of Boston, and by ENGINEERING NEWS. Advertisers patronizing either of these publications reach many times the number of architects than by any other class journals, either home or foreign.

Notes.

Wm. S. Barbour, C. E., is the newly elected City Engineer of Cambridge, Mass.

A new gas company was chartered by the City Council of Des Moines, Iowa, last Monday night.

The City Council of Peoria, Ill., appropriated $25,000 toward the proposed free bridge last Monday night.

Mr. Henry W. Wilson of South Boston, is awarded the work of surveying the *State Flats* in Boston Harbor.

London has 5,000 miles of gas mains, and 54,000 street lamps, which burn 3,000,000 cubic feet of gas each night.

The Delaware, Lackawanna and Western railroad Co. are replacing many of the wooden bridges on the line of their road with iron ones.

Brown stone of an excellent quality is quarried at L'Anse, Mich. The quarry is to furnish Chicago parties with 600,000 feet within the next two years.

All of St. Louis north of Washington avenue, is going to be lighted with kerosene lamps, saving thereby $20,000 per year. St. Louisians think gas too expensive.

W. L. B. Jenney, of Chicago, has been appointed Professor of Architecture and Design in the Polytechnic School, University of Michigan, Ann Arbor. Lectures will commence in September next.

The County Surveyor's office of Peoria County, must be a "big plum;" the following surveyors are candidates at the ensuing election in April—D. B. Allen, Edward Hudson, Joseph W. Alston and Arthur T. Birket.

A meeting of the Quincy, Ill., merchants was held on the night of the 21st to induce the Ohio and Mississippi railroad to extend its line from Beardstown to that point, and connect with the Quincy, Missouri and Pacific.

The King Iron Bridge Manufacturing Company, of Cleveland, Ohio, started up on Monday with a full complement of one hundred and fifty workmen. They start in with orders for thirty-seven iron bridges on their books.

The track of the Chicago, Clinton and Western railroad will be extended to Iowa city, Iowa, by July 1. It is already ironed for twenty miles beyond Cleveland, leaving fifty-five miles more, already graded, to tie and iron.

The Barney & Smith Manufacturing Company are now running 700 men and have under orders 16 sleeping coaches to be equal in finish to any now running; 14 day coaches; 650 freight cars, 500 of them being eight-wheeled merchandize cars; 150 freight cars for 3 feet gauge, and six narrow passenger coaches, in all over $700,000 worth of work. They have many inquiries about cost and dimensions of narrow gauge cars, mainly for short local roads.

Fireless engines are attached to street cars on one of the lines in New Orleans. They consist of a simple boiler and cylinder placed on trucks. At the terminus sufficient steam is taken on—as an engine does water—to last for the trip. The car obtains better speed and is more easily managed than one drawn by ho ses.

The earnings of the Indianapolis, Bloomington and Western road, from its passenger traffic, in the month of February, exceeded those of the corresponding month in 1875, nearly four thousand dollars, while it is estimated that an increase of thirty-six thousand dollars will be shown in earnings from the freight business.

The Cleveland Rolling Mill Company are putting in four of Deering's patent Automatic Steam Vacuum pumps in their Lake Shore Mills. These pumps will carry the water from the lake to a height of about seventy feet in the aggregate and will supply the rolling mill, the plate mill and also furnish the Standard Iron Company.

There could probably be no better illustration of the darkened state of the public mind about the causes of our present political disease than the approbation with which the present rage for cutting down the salaries of public officers is regarded, as a measure of economy. Far from being a measure of economy, it is one more step in the process by which a middle wall of partition has been erected between the honest, capacity and energy of the American people and the government it dearly loves and would fain be proud of.

Miller, Jamieson & Co.'s bridge and boiler works, of Cleveland, are running to their full capacity with constantly increasing orders. They have just completed a one hundred foot bridge for Warren county, Illinois, an iron Jail for Fort Scott, Kansas and a number of boilers for the Pennsylvania oil regions. They have orders for a large number of oil and other tanks for local firms and outside parties, and have just received an order for the steam heaters for the Case Avenue School building, the contract for which was recently awarded to Pierce and Chase, of Syracuse, N. Y.

Experiments continue to be made in France to test the efficiency of an engine having no wheels, but provided with what may be called legs. It does not roll; it walks, runs or gallops. It is like an ordinary engine, with straight rods terminating in broad circuler skates. There are three legs in front and three behind. The moving cylinders, instead of turning wheels, raise the feet. The invention, it is claimed, is particularly adapted for carrying weights up an incline, as a convenient substitute for the means now employed. One of these, which is at present at work on a French railway, weighs ten tons, and goes four to five miles every hour, but can accomplish, if desired, eleven or twelve miles an hour.

The matter of advertising, as a business measure, is often misunderstood. It is an undeniable rule of the trade that advertising pays. Of course the same judgment and prudence must be exercised in advertising as in any other part of one's business. If this is not done, instead of paying it may become a source of loss. It is more necessary to advertise now than it was 50 or 100 years ago. People are more busy now than they were then. They have less time and leisure to look about for what they want. They look to the newspapers to learn where their wants can be supplied, and they accept it as a settled rule that a man who advertises the commodities which he has to dispose of, instead of waiting for the people to find out the fact for themselves, is the best man to deal with, and most likely to give satisfaction.

About Sewer Grades.

By Geo. W. Rafter, C. E., Rochester, N. Y.
Written for Engineering News.

In a former article an attempt was made to establish the general proposition that a definite relation exists between the inclination of sewers and the prevalence of zymotic disease, in any given locality, thickly populated areas being in every case understood. An attempt will now be made to show how a system of sewer grades should be designed in order to secure a maximum of efficiency.

As before, attention will be invited to the condition of affairs in the city of Rochester.

The following tables, prepared from the meteorological records of the signal service office at this place, and from the records of the health officer show the relation of meteorological phenomena, for three years, to the deaths from zymotic disease during the same time,

An inspection of the tables will show that since 1873 there has been a large increase in the number of deaths from malarial causes; so that in 1875 the number of deaths from Scarlet Fever is greater than the total of deaths from zymotic disease during either of the two proceeding years. It will also be seen that the rainfall was fourteen inches less in 1874 than in 1873 and twenty inches less in 1875.

Moreover it is a fact that since October 1873 we have not had what is commonly termed a heavy rain storm. At that time five and eighty-seven hundredths inches fell in less than forty-eight hours. The effect of this heavy rainfall was to cleanse the sewers of old accumulations throughout the whole city. Not only were the sewers washed clean, but the street pavements, alleys, back yards, sink-holes and cess-pools were to a certain extent washed clean, and thus put into the best possible condition to resist an inroad from zymotic disease.

An examination of the daily record shows that at no time since October 1873 has there been more than two inches rainfall in twenty-four hours; and this is not sufficient to cleanse a system of sewers as faulty as that of Rochester.

Farther, an examination of the same record shows, that at no time during the period under consideration has the melting of snow proceeded with such rapidity, as to produce an amount of running water equivalent to a rainfall of two inches in twenty-four hours.

Moreover, the heavier rains since October 1873 have occurred only after periods of continued dry weather, so that not more than sixty-five hundredths of the total fall during any particular storm has found its way into the sewers, soon enough to be of any great value for flushing purposes.

During the first twelve days of August 1875 there were two rain storms of nearly two inches in twenty-four hours. (One and eighty-three hundredths the sixth, and one and ninety hundredths the twelfth). August is ordinarily more unhealthy than July. The beneficial effect of these two storms is seen in the fact that the number of deaths dropped from 75 in July to 56 in August.

It is generally supposed that rainy weather is of itself more unhealthy than fair weather. This is a mistake, the only difference in favor of fair weather being the greater liability to exposure during rainy weather.

March 1874 had the greatest amount of wind of any month during the three years. The deaths from zymotic disease in that month were less than in any other month during that time.

The retention of sewage in the sewers, as spoken of above, is the more lamentable when we consider that nature's provisions at Rochester, for disposing of sewage are of the most ample description. The Genesee river makes a descent of about two hundred feet at this point. The aeration and consequent purification of the sewage matter is therefore rendered certain, provided the matter to be purified is once gotten into the river. Failure in that is certainly failure in everything.

It is certain therefore that the grade of the sewer should be sufficient to carry all the sewage matter away to some point where it can by no means impair human existence.

In any particular case to determine the grade capable of performing this duty, it will be necessary to have accurate information relative to the average amount of water to flow through the sewer every twenty-four to thirty-six hours, it being unsafe to allow the sewage matter to remain in the sewer longer than that time.

Also the amount of human faeces, and other solid substances, which the sewer is regularly to dispose of should be ascertained. Not only the amount to be disposed of immediately, but the amount to be disposed of in the future, when the locality is completely built upon, should be estimated and allowed for.

The laws governing the adaptation of the grade to the sewage matter, and to the amount of water were stated in a preceeding article, (See Eng. News vol. 3, No. 4) and are therefore omitted here.

The following table of duty of water in rivers with varying velocities is taken from an English work on Sewage.

3	inches per second	will move	clay and work it up.
6	"	"	fine sand.
8	"	"	coarse sand.
12	"	"	fine gravel.
24	"	"	coarse gravel.
36	"	"	stones size of an egg.

The author of the work from which the above was taken farther says: sewage matter flowing through conduits should have the following velocities:

Conduits of 36 inches diameter require 30 inches per second velocity; of 18 to 36 inches in diameter require 36 inches per second velocity; of 6 to 18 inches diameter require 40 inches per second velocity.

We are now treating a branch of the drainage subject, which has as yet received comparatively little investigation. Upon this branch of the subject to advance opinions, with anything like dogmatism is certainly not the present writer's intention, Nevertheless, the author has some reasons for believing that most formulæ in common use for the flow of sewers, are radically deficient, inasmuch as they neglect important factors which should be taken into the calculation.

In the first place it will be a matter of surprise to many engineers to learn that a large proportion of the experiments on which present formulæ are based were made more than a hundred and twenty-five years ago.

The first item of error in these formulæ is the neglect to make any allowance for the different materials of which water conduits are constructed. Indeed it has been broadly assumed that no difference should be made. This idea has been so prevalent that a recent English writer on sewage, whose work has been republished and largely circulated in this country states, "that for all practical purposes the nature of the materials of which a sewer is constructed need not be taken into consideration."

The present writer with all due reverence to the eminent mathematical and other authorities who have written upon this subject, believes that in order to be practical in the higher sense of the word, which means *to be correct*, it *is* necessary to take into consideration the nature of the materials used in sewer building.

Failure one, then, consists in not allowing for the difference in coefficient of friction between glazed or glass coated sewer pipe and rubble masonry, for instance.

Before proceeding further with this investigation the following portion of a recent editorial in "*Engineering*" is given as corroborative evidence on the point in question.

"When M. Bazin presented his report to the Academy of Sciences in 1863 many illusions which had almost universally prevailed during the preceeding century were rudely dispelled, and from the multiplicity of fresh data the science (of hydraulics) received a new impulse.

Perhaps the most important of all the facts elicited was the vast and unexpected influence of what may be teamed the *skin* of the channel upon the speed of the current, etc." The gist of the matter is that M. Bazin proves by direct experiment that from an engineering point of view it is of the greatest importance to know whether the surface of a water conduit is brick, iron or glass, since the resistance varies widely for these different substances.

Error second has been in applying the same formulæ for the flow of sewage matter as for the flow of pure water. It is evident on slight inspection that the friction of sewage matter will increase in proportion to the consistency of the mass. Moreover, the nature of the substances, their tendency to agglutination must be considered and allowed for.

An excellent illustration of the inaccuracy of the old formulæ for a steady flow through the pipes is afforded by recent experience in laying an iron conduit from Hemlock lake to the city of Rochester. The pipe is twenty-eight miles inlength and was calculated by Eytelwein's formula to deliver seven million gallons in twenty-four hours. A measurement of the amount of water received at the reservoir proves that in fact the pipe is delivering more than nine million gallons in twenty-four hours.

This it is true is an error on the safe side and is merely cited as showing that this whole matter of the flow of water is yet to a certain extent empirical.

The following table compiled by an English engineer illustrates the question under discussion.

Table of comparative time of run of water through brick drains and glazed pipes.

INCLINATION.	Depth of water in inches.	Time through glazed pipes.	Time through brick drain.
Level	5.0	38.0	50.0
2.00 in. in 50 feet...	4.5	16.5	25.0
3.75 " ...	5.5	19.0	27.0
1.25 " ...	3.0	18.0	26.0
0.50 " ...	3.5	25.0	36.0
3.25 " ...	4.0	15.0	22.0
1.75 " ...	6.0	13.5	21.5

Where a large area is to be drained the first thing to be done is to make a minute topographical survey of the whole territory. This shows at once the lines of main drainage and the amount of fall which can be obtained along these lines. This also renders it possible to lay out the whole system to the best advantage; giving the greatest fall to the house drains; the next greatest to the street sewers; and so on diminishing the rate of inclination as the body of sewage matter increases and tends toward the main outlet.

To construct extensive sewers previous to this topographical work is generally to waste money, it usually happening that an increase of population or a more extended use of the sewers from any cause whatever increases the duty of these "thumbed in" sewers beyond their capacity to perform.

A sewer is wholly a sanitary contrivance. If it fail to preserve health, so far as it is intended to preserve it, it fails in everything. If it cause disease in localities previously comparatively free from disease, it becomes a public nuisance, and like other public nuisances should be abated.

It is important, therefore, before building sewers that those having their construction in charge should at least understand a few of the difficulties to be met with; as well as some of the reasons for the complete failue of many sewers already constructed.

The following table of sewers, etc., selected throughout the city of Rochester explains itself.

Name of Sts.	Ward.	Length of Sts.	Number feet of Sewer.	Grade per hundred.	Size of sewer. in inches	Kind of sewer	Depth of sewer.	No. of deaths from zymotic disease during six years.	Approx. area drained -acres
Oak.....	2	1300	1207	1.041	24	Brick	8.5	3	9
Greig.....	3	1600	1025	0.826	18 x 18	Stone	8.5	2	10
Green.....	4	450	450	2.000	12	Tile	7.0	0	5
Marietta.....	5	850	780	0.851	12	Tile	8.5	1	7
Troup.....	8	2975	2904	1.059	12	Tile			
					18 x 18	Stone	7.5	3	28
Prince.....	10	2500	2469	0.980	18 x 24	Stone	9.0	2	27
Wilder.....	11	2700	2612	0.675	24 x 24	Stone	7.0	15	20
Gregory.....	12	2300	2266	0.423	24 x 24	Stone		21	17
					12	Pipe	7.0		
Mt. Hope Av.	12	6000	3570	0.286	24 x 36	Stone	11.0	19	*
Munger.....	12	2100	2055	0.258	24 x 24	Stone	8.0	10	15
Hoeltzer.....	13	1500	1415	0.282	12	Pipe	10.0	11	10
St. Joseph....	13	4900	3150	0.200	24 x 24	Stone	8.0	20	
Hudson.....	13	4000	3000	0.257	24 x 24	Stone	8.0	15	

*Outlet for large area.

It should be understood that this showing is partially relative so long as no information is at hand as to the sanitary condition of back yards, alleys and the surroundings generally on the streets enumerated.

In conclusion it is certain we can by no expedients change the course of nature's general laws. Wind, rain and decomposition are beyond man's control. From a sanitary and engineering point of view, therefore, it only remains to give sewers such grades, or such an amount of water from artificial sources as to always convey sewage impurities away to some point where they cannot be dangerous to mankind.

There are not wanting intelligent engineers who hold that this method of removing sewage matter by water carriage is entirely wrong, that it is in fact the most ruinous source of waste of the age. Indeed the present writer has grave doubts as to its expediency on the score of national economy. This however is a question of so enormous extent as to render its discussion impossible at this time.

RESUME.

In designing a system of sewerage and drainage the points meriting consideration are:

1. Surface Configuration. To determine this, topographical surveys are necessary.

2. Maximum, minimum and average rainfall.

3. Population, present and prospective of the proposed drainage area.

4. The amount of solid matter likely to pass into the sewers every twenty-four hours, should be estimated.

5. If the given drainage area has, or is to have an artificial water supply, it should be determined how much water can be spared daily for the sewers in addition to that finding its way to them through the ordinary economy of life.

6. The materials of which the different classes of sewers are to be constructed should be decided upon in order that proper allowance may be made in estimating grades for varying coefficients of friction and agglutination.

It is customary in works on sanitary engineering to give tables and statements of grade. These tables and statements are apparently founded on the supposition that the general conditions are the same for every place, while they are in fact often entirely dissimilar. Moreover these grades are frequently but wild guesses, founded on so called "practical experience."

The present writer therefore refrains from giving any "grades per hundred" whatever, preferring to calculate them for each case occurring in practice, only after the data referred to in the resume shall have been obtained.

Detroit Water Works.

From the 24th annual report of the Board of Water Commissioners, of Detroit, for the year 1875, we condense the following:

Our own city differs from nearly all others in this—that we have put the cost of maintenance exclusively upon the water consumers, and, for a long series of years, have in addition thereto, made them pay for all water used for the purposes of the Fire Department and for the public ornamental and drinking fountains. Philadelphia, one of our oldest cities in water works experience, collects from the property fronting on each side of the street as the pipes are laid one dollar per foot front, and the report of their Water Board shows the sum thus collected in 1874 to be $198,896.99. In the city of Chicago a lot of 24 feet front, and a one-story house upon it the assessment for a family is $5; if the front is extended to 45 or 50 feet, and the house carried up five stories in height, the number of persons occupying the house being the same, the assessment is $28—showing that in an assessment of $28 the realty pays $23. In Brooklyn, N. Y., a family in a one-story house with a frontage of 16 feet is assessed $4; if the frontage of the lot is extended to 37 or 50 feet, and the house made five stories high, the assessment is $18—showing that in an assessment of $18, the realty pays $14. New York city has the same system of assessment, with a proviso that all lots of more than 50 feet front shall be subject to special assessment. This system of assessment obtains generally throughout the country, while in this city, from the establishment of the works to the present time, the owner of an entire block has been assessed the same as the person having but 12 or 20 feet—the assessment being only for the water used. There are other reasons why the entire cost of the works should not be put upon the water consumer. It has been the rule of the board for many years, as pipes are laid, to put in branches wherever the fire commissioners require five hydrants—involving considerable expense; in addition to which the board are required to expend a large amount in laying pipes for protection against fire.

In the past season more than 2000 feet of 8 inch and 6 inch pipe have been laid at the request of the fire commissioners, and in accordance with the general wish of parties having a large amount of property exposed to loss by fire without proper protection. In addition there has been laid 11,100 feet of 6 inch pipe on streets designated as to be paved the coming season, and as they were connected with streets already paved and were destitute of fire-hydrants, the board deemed it their duty to lay the pipes. In all these streets there was already an abundance of water for the purpose for which rates are assessed—consequently no additional revenue was received for this large outlay. In accordance with the advice of the law officer of the city, and of their own attorney, the board will enforce the provisions of the law, to assess and collect a tax upon property in front of which water pipes are laid and which do not pay water rates.

The tax on vacant lots is three cents per foot frontage. For the first time in the history of the present works, their entire annual expense,—cost of construction (including the pipes laid), operating expenses and the interest upon the bonded debt—has been paid from the ordinary sources of revenue of the board. The average daily quantity pumped was equal to 107 gallons for each person in the city.

The net increase in length of pipe for distribution is 13 miles. There have also been 2½ miles of force-mains laid to connect with the new works, making the total pipeage of the city 192¼ miles, of which 88¼ miles is iron pipe, and 104 miles wooden logs. About 3 miles of iron pipe has been laid in streets previously supplied by logs.

The mains laid range in diameter from 42 in. to 6 in. The laying of about 4 miles of 6 in. to 10 in. pipe is recommended for the present year.

The report of the engineer shows that the number of gallons of water pumped was 917,600,000 in excess of the previous year, or over 10 times the increase of 1874 over 1873. Taking the first months of the past three years, we find the amount of water pumped during that period in 1873 was approximately 881,500,000 gallons; in 1874, 704,000,000; while in 1875 it rose to nearly 1,215,000,000, or about 75 per cent. greater than in 1873. This shows the enormous waste during the severe weather, mainly in the lower portions of the city.

The water rates for the past year amount to $195,803.64. If 2 cents per 100 gallons—the meter rate—had been received for all the water pumped, there would have been $841,490.85, or nearly four and a half times as much.

People are accustomed to regard water as something as costless and free as air; while they regard gas an expensive article, of which much care must be taken in using. And yet at 2 cents per 100 gallons, water is worth $1,50 per 1,000 cubic feet—much more than most of us are now paying for gas. The only reason of this difference in feeliug is that gas is measured to consumers, while the leaving a faucet open to prevent improperly arranged pipes from freezing in winter, or to let the water run cool in summer, adds nothing to the rates. Could this waste be checked, the rates might be materially reduced, and watchful consumers receive a benefit from their care. But this cannot be until a water meter is invented, as cheap, and certainly as reliable, as a gas meter. But it may be much lessened by placing meters in large establishments.

In 1861 the amount of water used in the city of Boston had risen to 103 gallons per day to each inhabitant, and the board became alarmed lest the supply, which is limited, should fail, and they commenced the introduction of meters. The consumption was gradually reduced until in 1866 it had fallen to 58 gallons per day, a decrease of 43 per cent., while at the same time there had been a gain of 48 per cent. in the average head, and notwithstanding the decreased consumption the revenue increased $120,000, or 29 per cent.

In 1870 the supply was less than 60 gallons per day per head, and in 1874 one-eighth of the whole consumption passed through meters, and paid one-fourth of the revenue. This result was obtained by the use of about 1,100 meters. Certainly 60 gallons a day should be an abundant supply for all purposes, and had this amount not been exceeded last year, there would have been a saving of nearly $9,000 in fuel alone.

But it is often stated that this waste of water is not really a loss to the city, as it aids in keeping the sewers clean. We have here about eight square miles drained by sewers, and an inch of water on that area would amount to 139,000,000 gallons. Assuming that four-fifths of the rainfall passes off through the sewers, then during a fall of one-fourth of an inch, or one smart shower, as much water would flow through the sewers as would otherwise dribble into them in two and a half days at the average daily distribution of the past season.

Taking the amount of the contracts for the new works already let, and the cost of pipe-laying, etc., the cost for construction is as follows:

Amount paid on contract and work finished:		
Cost of land	$35,000.00	
Inlet pipe	16,000.00	
Laying mains	23,000.00	
Engineering, superintendence and inspection	9,000.00	
		$80,000.00
Amount of contracts not yet completed:		
Dock, canal and basin	$102,000.00	
Pump wells, (bolts, etc.)	34,000.00	
Engine	104,000.00	
42 inch main	162,000.00	
30, 24 and 12 inch do	26,000.00	
Bends and branches	10,000.00	
Gates	14,000.00	
		$452,000.00
Total		$532,000.00

Which will be seen to be far within the estimates for the same times.

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CONSUMPTION OF SMOKE.

Those cities which are also manufacturing centres are greatly troubled by the quantity of smoke poured forth from hundreds of workshop chimneys. Within the last few years the nuisance has become aggravated by the increased consumption, from motives of economy, of soft or bituminous coal by private individuals. It would be a great advantage, on the ground of personal comfort alone, to get rid of this black cloud, as well as an improvement to the looks of any city. Few people are however so public spirited, at any rate few of those who have charge of large manufacturing establishments, as to go to any expense for appliances to promote this end alone; but when it is considered that the smoke represents so much fuel which is not utilized, it may become a paying operation if we can make this now wasted heat available.

When coal is first put upon a fire, as has been so well explained in Mr. Dudley's recent papers, it undergoes a process of distillation; the volatile portions of the coal are driven off, and this gas and smoke from all pieces except those immediately in contact with the incandescent fuel, rises without being heated sufficiently to combine with the air which comes up through the grate. A high temperature is necessary to secure the chemical combination. If the gases now pass off through the comparatively cooler flues, smoke-pipe and chimney, they never burn. It is to secure their chemical union with the oxygen of the air that what is called a combustion chamber is provided, a chamber often lined with non-conducting material, where the heat will consequently be intense, and the desired union of the elements be possible. Contact of the gases with iron surfaces, such as the sides of the stove or of the fire-box, and the surface of the boiler, abstracts the heat and chills them below the combining temperature. If it were practicable to produce a downward draught, so as to cause the gas from the fresh coal, mingled with air from orifices around the door, to pass through the white hot coal below, the desired combustion would be effected.

A simple modification has recently been introduced in some furnaces in Chicago which seems to produce the desired result. Within the furnace is placed a partition extending down towards the fire, somewhat of the nature of a hanging bridge, as it is called, the partition being situated near the rear of the fire. The gas and smoke arising from the coal, with air from around the fire door when passing to the flue is deflected upon the surface of the burning coals below the bridge, and become heated sufficiently to be burned. The space beyond this bridge thus really becomes the combustion chamber, although such a fact is not stated in the report of trials of the contrivance which we have seen. From a contemporary we gather some facts in regard to the increased efficiency of the furnace with the introduction of this partition.

A boiler of N. K. Fairbank & Co's. which, in a careful test, evaporated 7.74 lbs. of water per pound of coal, with this improvement evaporated 9.15 lbs. of water per pound of coal, a gain of over 18 per cent. The Palmer House boilers, in a prolonged trial of two months with, and two months without the improvement, showed a saving of from 23 to 24 per cent. At the Chicago Water Works, during February of 1875, 40,000,000 gallons were pumped per day, with an average consumption of 96,000 lbs. of *hard coal* at $8.00 per ton. This would show 421 gallons of water raised for each pound of coal burned, and would make the coal $9.49 per million gallons. During eight days of February, 1875, after the introduction of the partition under the boilers, 40 million of gallons were pumped with an average of 85,000 lbs. of *soft coal*, at $5.50 per ton. Each pound of coal therefore raised 479 gallons, at a cost of $5.73 per million gallons. It is unnecessary for us to compute the annual saving at this rate. The most economical pumping with hard coal was in November last; at that time 38 million gallons per day were raised with 85,000 lbs. of coal, or 463 gallons per pound, giving a cost of $8.64 per million gallons. The saving here is $2.91 per million gallons.

The economy shown is enough to warrant the change, even at more expense than required to put in a simple partition. We gain besides the benefit to the city from the entire absence of smoke. House stoves and furnaces can readily be similarly modified, but the saving cannot, in that case, be so simply shown, as by the gain in evaporative power of a boiler.

POLITICAL ENGINEERING.

Perhaps the largest incorporated *village* in America, if not in the world, is the village of Hyde Park immediately south of, and adjoining this city. It comprises an area of twelve miles from north to south, with a mean width from east to west of four miles. It is traversed by every one of the great trunk railway lines leading to the east, beside the Illinois Central running south. Within its limits are the thriving manufacturing settlement of South Chicago and a score of suburban settlements, the homes of large numbers of Chicago business men. It has the highest, dryest, most desirable land, and the deepest, meanest, and most irreclaimable swamps, of any of Chicago's suburbs, but all are alike favorite speculative property and are held at prices favorable for taxation, but slow to find purchasers in these dull times.

This wide-spreading village contains the broad South Parks with their splendid boulevards, where the fashion and fancy of Chicago air themselves and their equipages in the long evenings of summer time; its people are supplied with water from Lake Michigan, forced into their houses by direct pressure upon the Holly System, and the glimmer of an occasional gas lamp is to be seen during the dark nights. It is the home of many of the most successful merchants and professional men of this city; it furnishes Cook County with representatives, and can turn out more politicians to the acre than any other place of its dimensions west of New York city, to say nothing of a family of renowned engineers that are a part and parcel of its very constitution.

In the primitive days of the corporate existence of this broad village, its government was a simple affair and the principal legislation required was how to drive out the stink factories that from its southern confines polluted the air of its northernmost limits and interfered with the appreciation of the contiguous swamps. In those halcyon days taxes were nominal, real estate was doubling in price faster than transfers could be made, and a Village Engineer had not made his appearance in the annual estimates of the board of Trustees. Five average business men met occasionly to talk about the opening of a street, how the last suit with the Fertilizing Co. was progressing, where a bit of sidewalk was wanted, and what bills were to be audited and ordered paid, all of which proceedings were duly recorded by the Clerk in an interval of leisure at his city office next day.

But all this came to an end. Such a large and growing village needed an engineer, and so the owner of the broadest swamp bagged the berth for a relation, who, because he could splice a rope and steer a lumber scow safe from mill to market, must of course be qualified to superintend the construction of roads or lay out a system of sewers. The sailor engineer came to grief before an investigating committee, and just about that date times being dull, real estate flat and money scarce, it was considered a proper time to inaugurate a complete city government and do some engineering.

The following is the result, which is pretty good for a village of 4,000 people. We quote from the Chicago *Tribune*:—

A table summed up from an average of several monthly pay-rolls will perhaps somewhat astonish the tax payer who believes that economy was the motto under which the present officials were elected and appointed: Trustees $3 for each meeting, making an average aggregate of $750 per annum; Village Clerk, $1,500: Assistant Village Clerk, $600; Village Accountant, $2,500; Village Engineer, $3,000; Draughtsman, $1,500; Assistant Draughtsman, $600; Rodsman, $500; Village Attorney $3,500; Superintendent of Public Works, $2,200; Foreman, $1,000; Superintendent of Water Works, $2,000; (jointly with Lake); Village Treasurer, $1,500; Village Collector, $1,500; Assessor, $1,500; Police Captain, $1,200; Police Sergeant, $1,000; Police Patrolmen about $12,000; total (not including various temporary assistants employed for brief periods) $37,650

This is a very considerable total in itself, but it is really increased to each tax payer by about 15 per cent. That is, the appropriation for each of these salaries is made 15 per cent. greater than the amount of the salary to be paid, and the aggregate of taxes assessed for these salaries is of course 15 per cent greater; this is done to cover the loss by delay and non-collection of taxes. Consequently every property owner is assessed at a rate higher than he ought to pay, in order to make up for the short-comings of delinquents, and, practically every man who pays his taxes pays his proportion of the above salaries, plus 15 per cent.

As an engineering journal we are dealing only with that portion which refers to the office of Village Engineer. The salary is a very liberal one and it is fair to presume that there was work to be done in the village that required the services of such an expensive official, and his corps of assistants. But there has not been a square rod of pavement laid, not a bridge built that was designed by the present incumbent, not a building erected under his supervision, not a foot of sewer constructed; he had nothing to do with the parks; he had nothing to do with the water supply; we are really at a loss to know what he did do except to wag his tongue and draw his salary.

The last board of Trustees of Hyde Park inaugurated the present senseless and extravagant system of expenditures, and it could hardly be expected that the crowd of hungry office seekers that constitute the present regime were going to improve on their predecessors in the way of economy. The taxes this year amount to $47 per capita for each man, woman and child in the village, and this at a time when it is all that most of persons can do to get money enough to pay running expenses of living. The political parties of this tax ridden community are preparing for a hot contest during the coming week; candidates for a board of Trustees, independent of party but pledged to an economical administration of affairs have been placed in nomination by the tax payers of the village; their names and reputations are the best guarantees that could be had as to their fitness for the office, and we hope to see them elected by a large majority.

THE WORCESTER CATASTROPHE.

As we go to press the news of the breaking away of the reservoir dam at Worcester, Mass. is being telegraphed to every part of the country, and of the leading features in the great catastrophe our readers will have been apprised before our paper reaches them. At present we have only the hastily collected information of the daily papers, whose accounts would be unsaleable if not sensational, and whose reporters are ready to decide upon the causes of the failure and to say where the responsibility should be cast, upon the imperfect evidence obtained amid the confusion and disorder attendant upon such an accident.

It appears from present evidence that the dam was very solidly constructed, and in the opinion of the former City Engineer, under whose supervision it was built, was able to withstand the greatest strain that was likely to be brought against it. It is probable, however, that, as is customary in this country, vigilance was relaxed and the "small leak" went unnoticed and uncared for until it was too late to avert the consequences of the long-continued weakening process that had been going on within the wall. There are cases, however, where human wisdom and skill are unable to provide for every

possible future emergency; we hope that this unfortunate accident will be investigated to the very bottom, and if there has been a failure in engineering skill and knowlege, that we may find it out and use the facts so obtained for the benefit of the profession, and of the general public who trust to the engineers for the safety of their lives and property.

(Special Dispatch to the Chicago Tribune.)

WORCESTER, Mass., March 30.—The original dam was built on Lynde Brook in 1863, when the Hon. D. Waldo Lincoln was Mayor, and was rebuilt in 1870-71, under the supervision of the Hon. Phineas Ball, City Engineer. By this rebuilding the original dam was raised 19 feet, and the capacity of the reservoir was raised to a maximum of 663,330,000 gallons, or, by the use of flush boards, to 775 572,000 gallons. In fact, this latter amount was stored there May 11, 1873. The outlet and waste-pipe of the reservoir are 24-inch pipes extending beneath to the dam, a gate-house being erected at each side of the dam. The stone heading of the arch which carries these pipes under the dam on the side next the water is a mass of solid stone masonry in cement, 10 ft. in thickness. There is also a water-gate at the lower gate-house 30 inches in diameter. The dam is faced with a heavy wall of masonry, and has in its body several spiling walls, parallel with the face-wall of stone, laid in cement, the spaces between these walls being filled in with clay which, when put in, was thoroughly puddled and packed. The dam on the water side is protected by a closely-laid cable-paving to prevent washing and attrition by the waves. When enlarged in 1870 it was so strongly built as to be considered entirely safe if carried up 5 feet higher, that being the ultimate purpose at the time, to be accomplished whenever the additional capacity of the reservoir was required. The Hon. Phineas Ball, City Engineer, was confident that, even with this proposed additional height, which, however has never been added, the dam would have been entirely safe.

The method of sinking the water well, at Sycamore, Illinois, illustrated in our last issue, is what is known as sinking on a *drum curb*. The contrivance is simple and often employed. Indeed when used on a large scale, with the addition of a shaft enclosed at the top, and the introduction of compressed air, we get the caisson employed for putting down bridge piers. The transverse wooden braces strike us as unnecessary, and as likely to be much in the way when taking out material. As the ground was firm enough to stand unsupported at a depth of twenty feet, the pressure would be moderate, and we query whether the iron ties were called on to do much work. We shall be glad to hear of the details of the progress and completion of the undertaking. Accounts of means used to overcome obstacles are always instructive and interesting.

We want several copies of No. 2 and No. 7 of Vol. 3 ENGINEERING NEWS to complete setts, and will give *one month's subscription* for each copy of either of these Nos. sent us this month.

Floods and Economy of Water.

At the fourteenth ordinary meeting of the present session of the Institution of Civil Engineers, held Tuesday evening, the 29th of February, Mr. George Robert Stephenson, President, in the chair, a paper was read "On the Floods in England and Wales during 1875, and on Water Economy," by Mr. George James Symons, secretary to the Meteorological Society.

In 1875, the number as well as the volume of the floods was unusual. They were prevalent in many parts of England and Wales during the whole of the latter part of the year, especially in July and November.

The first flood, on the 15th of July, was the result of a rainfall of large amount and duration. The rain lasted on an average about thirty hours, but in most localities 90 or more per cent. of the amount fell in twenty-four hours, and at some stations all fell in twenty-four hours. This flood was chiefly confined to the West of England, and its effects were most serious in Monmouthshire and South Wales, where at many stations the rainfall on the 15th of July was nearly twice as great as the amount previously recorded at those places. Generally heavy summer rains occur in thunderstorms, but the July rain in Monmouthshire and South Wales was not of this type, and was quite as remarkable for its steady persistent rate, of about 1 inch in each of five successive periods of five hours, as for the total quantity. To give a general idea of the rain in Monmouthshire and South Wales, a few statons were mentioned at which the depth exceeded 4 inches Thus it was at Tintern Abbey, Monmouth 5.91 in.; at Springfield, Newport 5.45 in.; at Tynant Raoyr, Glamorgan 5.10 in.; at the Cemetery, Cardiff 5.05 in.; and Ely, Cardiff 5.02 in. The damage caused by the flood was considerable. The Avon and Frome overfloved their banks; at Cinderford, Gloucester a reservoir burst and flooded two or more mines; at Monmouthshire a reservoir burst and numerous bridges were swept away; and the traffic on the greater number of the Monmouthshire and Glamorganshire railways was interrupted.

From the 16th to the 18th of July heavy rain fell in various parts of the East of England and the Midland Counties, but with no very exceptional amounts, the largest reported being near Louth. 1.36 in.; and at Halifax 1.18 in. The districts visited by these rains had, however, previously been nearly saturated by those of the 14th to the 16th, consequently the results were very serious, especially in Staffordshire and the adjoining counties. In fact, throughout the Midlands much damage was done, and many towns were inundated, including Northampton, Huntingdon, St. Ives, Burton-on-Trent, Kidderminster, Coventry, Nuneaton, etc.; a canal burst near Tamworth, and railway traffic was stopped on several lines.

Although during August and September several floods occurred, doing considerable local damage, they were quite eclipsed by the much larger and more general ones of July, October and November. On October the 9th a heavy fall of rain occurred over central England, especially in the dry district extending north-east from Banbury towards Northampton. The depth of rain at Banbury, and at stations above it in the valley of the Cherwell, was 3 in. or upwards, consequently that river was excessively flooded, as was also the Avon, both at Stratford-on-Avon and at Evesham. During the next nine days there was occasional slight rain, amounting altogether to about ½ in., which was just sufficient to prolong the descharge of the above flood. Much land was therefore under water, and most of the rivers of central England were fuller than usual on the 18th of October, when another heavy fall of rain commenced which lasted through the 19th and part of the 20th. During this time, upwards of 3 in. of rain fell over part Staffordshire; and at Exeter 3.26 in. decended in a few hours, which produced much local but no general damage. It was far otherwise in the great Midland tract, which had received upwards to 2 in. depth of rain. The ground being saturated or nearly so, all the low-lying lands were flooded, and the total area under water was probably greater than has been since 1852.

Some idea of the exceptional nature of the floods of 1875 might be gathered from the observation made on the height of the Avon, at Stratford-on-Avon; Since 1800 there had been only ten floods exceeding the height of 4 ft. above the weir, and four of these were in 1875, in which year alone more than one flood had reached over 4 ft. Observations at Evesham, 16 miles lower down the river, gave nearly the same results, the slight difference probably being due to the the tributuries which the Avon received between the two towns.

The enormous amount of damage and loss caused by these floods, suggest forcibly the question, "Can future floods be abated?" either by embanking, constructing storage reservoirs, or lowering the water level. There was a prevailing popular demand that the flood water of the upper Thames should be stored, but probably those who urged this did not realise the enormous amount of water to be dealt with. The reservoir storage adequate to prevent floods on this river would have to be at least 160,000,000,000 gallons, and owing to the Thames valley being singularly destitute of good natural sites for reservoirs, their construction of adequate capacity would cost at least 15,000,000*l.* sterling; this probably was a sufficient reply to the suggestion of storage regarded solely as a remedial measure against floods.

Considering that the health of the nation depends on the purity of its water supply, and considering the many uses of water for manufacturing purposes, and the great pecuniary loss resulting from floods, it seems remarkable that there was in England no central body charged with the supervision and control of so important a matter. It was believed that had a central department existed to receive information of the depth of the rainfalls, and with power to telegraph the information to local officers having the sluices, &c., under their absolute control, much of the recent damage might have been averted.

The quantity and quality of water were so frequently discussed together, that a few words upon the latter question might not be out of place. The purity of water supplied for drinking purposes was of the highest importance, but the extreme refinement of modern analysis had seemingly led chemists to set up a standard of purity in excess of the necessities of the case, for every source of supply, even deep well-water and mountain streams, had been objected to on some ground. Every one engaged in selecting a source of water supply looked out for the best obtainable at a reasonable cost; it could scarcely be expected that more should be done. Of the total supply probably not one-hundredth part was drunk, and not one-thousandth part cold and unmixed with other ingredients. It was hard that nine hundred and ninety-nine parts must be of the ideal purity for the other one that might be drunk, especially considering that the better class of domestic filters would remove everything injurious.—*Engineering*.

Thomas S. Scott, Esq., is Chief Architect of Public Works for the Dominion of Canada.

Collingwood Schreiber is Chief Engineer of the Intercolonial Railway.

William Kingsford, Esq., is Engineer in Charge of Public Works, Ontario.

John G. Sippell fills the same office in Quebec.

The Gas Question.

The wide-spread disaffection against the Gas-light Companies, aided by the low price of kerosene, has assumed such serious proportions that we hear from all directions of concessions in price. In this and adjoining cities a reduction of twenty-five cents per one thousand feet has been granted; a saving to the consumer of about nine per cent. Possibly if this had been done prior to the popular clamor, it would have received more credit, but since it is the result of compulsion the question natuaally arises, will the reduction satisfy the consumers, and should it not be larger? The companies protest that it is all they can affors to yield. Let us see.

The following list of dividends of our New York and vicinity Gas Campanies shows that notwithstanding the reduced consumption occasioned by the economical tendency of the hard times and the introduction of oil their profits were very large, and when we consider that their construction account, which is large, is almost universally paid out of profits, and a large reserve fund is constantly increased before the distribution of dividends, the profits, for hard times like these, seem enormous.

Mutual, New York	10 per cent.
New York, "	20 "
Metropolitan "	10 "
Harlem, "	8 "
Manhattan, "	35 "
Nassau, Brooklyn,	8 "
Brooklyn, "	20 "
People's "	7 "
Metropolitan "	7 "
Citizen's "	12 "
Williamsburg "	15? "

All cash dividends.

The effect of these large dividends is seen in the market price of the stocks, which, till recently, was in many cases three times the par value.

The liberality claimed in making a concession of even nine per cent. in the price of gas, is scarcely substantiated when the subject is closely examined. Last year the price of coal to our New York companies was reduced one dollar a ton; this year their purchases have been made at a further reduction of from fifty to seventy-five cents per ton, making a total reduction of from $1.50 to $1.75 per ton (from $7.50 to, say $5.88.) Allowing a make of 9,000 cubic feet of gas to the ton, this corresponds to a reduction, in this item alone, of, say, 18 cents per 1,000 feet. At the same time wages, and nearly ever other item of cost has declined largely, making a total reduction in cost of considerably over 25 cents per 1,000 feet, the amount which, in their generous liberality, the gas companies have reluctantly conceded to their dear "patrons," protesting, at the same time, that a further reduction would be runious to them.

The companies are actually making more money, on a given production, to-day, with this reduction in price than they were two years ago, when their dividends and stock showed their profits to be enormous; yet the president of the Gas-light Association tells us that their busness is one or "truth and conscience." Verily, the conscience must be as attenuated as the gas they furnish,

The high price of gas is maintained, 1st, because of an unwillingness to part with an exhorbitant profit and a supposed ability to compel it; and, 2d, because the business is in the management, largely, of men who, through personal interests or ignorance, or both, have been averse to introducing into it the scientific investigation and progressive developement to which it should be peculiarly open, and the tendency of which, in all other industries, has been to cheapen and improve products.

There are honorable exceptions to this second class, so far as individual engineers are concerned, but they are few, and their personal influence is not sufficient to overcome the unhealthy conservatism of the men they try to serve.

Some other companies attempt to show progressive tendencies by retaining reputable chemists, but as the talents of these gentlemen are confined to the simple routine of photometric tests, and the study of what density will pay the companies best. Investigation being restricted to the one inevitable, old-fashioned system, their employment does not mend matters, but is rather a constant reflection upon the fitness of the engineer in charge who would properly be an expert himself and thoroughly competent to test results. But how can it be expected that subordinates will be intelligent and ambitious,

when those in authority over them are indifferent to any improvement, and discourage every effort that aims at cheapening the cost of gas by the adoption of any process of manufacture differing from the antiquate done used by our fathers half a century ago.

We do not propose to make ourselves the advocates of any particular system or process of gas-making; but it is no secret that gas at a quality much superior to that furnished by our companies, is now being made in many places, and, it is claimed, at a cost greatly inferior to that of gas made in the ordinary way. The figures on which some of these claims are made have been published in these columns, and are of easy verification, Yet what have our great gas monoplies done towards the investigation of these claims, and towards introducing such improvements as may lessen the cost of gas, both to them and consumers? We have knowledge of the fact, that a party of responsible gentlemen having made expert and practical examination of the residual, or waste product of one of our New York gasworks, offered, on being assigned the limited space of fifty feet square, on the company's very ample premises, to erect, without expense to the gas company and without interference with ts regular business, an apparatus which should return to the company, from this waste product, a value estimated at over $600 a day—nothing to be paid by the company until the success of the undertaking should be fully demonstrated, and then by a moderate and reasonable proportion of the savings effected. The process was in successful operation elswehere; it was no untried experiment, and its claims were, and are, of ready verification. Yet this proposition was not entertained by "the most progressive of our New York gas companies." This corporation now, naturally, joins the others in declaring that any further reduction in the price of gas cannot be thought of.

This is but a sample of the manner in which the cost and selling price of gas is maintained, and it shows how little can be expected from the progressive instincts of those who control this enormous business. This giant monopoly is not, however, beyond the influence of the most insignificant of its patrons, and the substitution of oil for gas, which improved lamps and low prices have greatly stimulated, will, undoubtedly, oblige the gas companies to move forward, with the rest of the world, in seeking real economy through scientific investigation. and the employment of engineers thoroughly qualified by scientific and practical education, to manage their works. Till this is more generally the rule, we despair of seeing that progress made in the art of gas-making which, in reducing its cost, will, in much greater ratio, increase its application to the varied uses of industry and civilization.—*Engineering and Mining Journal.*

CORRESPONDENCE.

Answer to R. in NEWS, Feb. 5th, 1876:—We should as soon think of "retaining" a Judge as a surveyor.

Any Co. Surveyor is legally bound to make a survey of any land in his county, and furnish any information that he may thus obtain, to any of the parties interested or to the court, provided he is requested so to do, and can collect reasonable compensation therefor. His having made a survey for one of the parties, is no bar to his making a re-survey of the same land for any other party and will not exempt him from the *duty* of making such survey when requested; and we deem this the only honorable course open to any surveyor. A surveyor is supposed to be as disinterested as a judge.

Mr. Shields in answer, No. 1, to Mr. Pierce's problem says: "For that survey by its meandered lines made said N. E. ¼ a fractional one." We had always understood that a section was made fractional by a meandered body of water, or an Indian boundary. See Sec. 2, Act of Congress Feb. 11, 1805, last clause.

In NEWS of Feb. 5th, page 45, line 25, for 17th read 18th. B. F. D.

The Rainy Season.

The rains this season have not only been copious but general throughout every section of California. The following figures show the amount of rainfall, including melted snow, at several of the higher points, to the 9th instant, in inches: Shasta, 74; Sonora, Dutch Flat and Weaverville, each, 53; Grass Valley and Placerville, each 47; Auburn, 39: Calistoga and Lakeport, each, 33; Santa Rosa, 30; San Francisco, 29; Napa, Santa Monica, Los Angeles, San Lui Obispo, each, 28; Oakland and Fresno, each, 26; Petaluma, 24: Santa Barbara, 21; Woodland, 20; Martinez, 19; Colusa, 18; and San Diego, 10.—*Alameda Co. Gazette.*

PUBLICATIONS RECEIVED.

Newport Water Works. Report for 1873, '74 and '75. Newport, Ky.

Third Annual Report of the Lowell Water Board. Lowell, Mass. 1876.

Second Annual Report of the Watuppa Water Board. Fall River, Mass. 1876.

On the Nipigon or Copper-Bearing Rocks of Lake Superior, with Notes on Copper Mining in that region. A paper read before the Montreal Natural History Society, Feby. 1876, by J. W. Spencer, B. A., Mining Engineer.

The Iron Works of the United States. A Directory of the Furnaces, Rolling Mills, Steel Works, Foges and Bloomaries in every State. Prepared by the American Iron and Steel Association. Philadelphia, 1876. In this compilation Mr. Jas. M. Swank, Secretary of the Iron and Steel Association has brought together a large amount of valuable statistical and other information relating to the iron trade of this country which must make this directory a necessity in the office of every person engaged either in the manufacture or sale of iron throughout the country. The price is *two dollars.*

Manufacturers' Intelligence

The Milwaukee (Wis.) Iron Works has every department in full operation and is employing over one thousand men.

Crane Brothers' Manufacturing Co. of this city, have shipped during the last week a full line of productions of their establishment, including pumps, elevators, etc., to Philadelphia for display at the Centennial Exhibition. They report business exceedingly good and are employing over 600 men on full time.

The Geo. F. Blake Manufacturing Co. of Boston have just completed the pumping machinery for the new water works at Newcastle, Del., and a set of pumping machinery for the new water works at Austin, Texas. They have also just completed the largest plunger mining pump ever constructed in this country, upon the direct acting principle, for the Pennsylvania Coal Co. and are now engaged in making the air pumps for the steamer Great Republic on the lower Mississippi River. This establishment is now employing their full complement of men on full time, and have large contracts on hand.

Contractors' Intelligence.

The first locomotive in China has made a trial trip of one mile on a tramway near Shanghae.

The Milwaukee River is to be redocked, at Milwaukee, on the east side between Detroit and Buffalo Streets.

The first and only iron bridge on the Pacific coast was opened to travel on the 18th of last month at Santa Rosa, Cal.

J P Taylor & Co. Chicago have the contract for furnishing the iron castings and fence for the new court house for Nevada, Storey County, Iowa.

The contract for the construction of the new jail building at Macomb, Mc Donough Co, Ill., was awarded on March 17th to J. M. Price & Co. of Macomb, for $23,-000, by the County Commissioners.

Supt. Purdy, in his recent report on the water works of Lake, Cook Co., Ill., earnestly recommends the purchase of a pump of improved manufacture, with a pumping capacity of 3,000,000 gallons every twenty-four hours.

The contract for the construction of the Milwaukee Avenue viaduct, in this city, was awarded last week by the Board of Public Works to James Kincaid, for $68,-181.61. The work will be commenced when the weather is propitious.

The American Bridge Company of this city are putting in the pneumatic foundations for a railway and highway bridge over the Des Moines River at Keokuk, Iowa. There will be four piers, one of which is completed and two in course of construction, sunk on inverted caissons built of timber.

Henry W. Blanchard and associates of Boston, have signed a contract to build a three foot gauge railroad from Kelley to St. Stephens, N. B. It will be known as the Great Southern R. R.; will be 74 miles long, and is to be completed by July 1st, 1878. Work will be commenced upon it early in May.

H. A. Streeter, proprietor of the Globe Iron Works of this city, has just completed his contract for the entire iron work of the new jail building at Fowler, Benton Co. Ind. and the new Insane Asylum at Jefferson, Cook Co., Ill. Business at this establishment has been exceedingly good throughout the season, and they have now contracts ahead for over two months.

The contract for the building of the new Court House at Racine, Wis., was awarded last week, by the Building Committee of the Board of Supervisors to J. A. Bently & Son of Milwaukee, for $39,400, H. R. Bond of Milwaukee, to whom the contract was first awarded for $36.500, having withdrawn. If Racine stone is used for footings $800 is to be deducted from the contract price. April 23d is the day set for the work of building to be commenced.

Work on the new Welland Canal is again in full blast. The contracts require that the canal shall be completed this year, but it is extremely doubtful if the entire line will be in readiness by the time specified, as much remains to be done at the Lake Erie end. The harbor at Port Colborne must be deepened and the pier extended, and this kind of work cannot be hurried. The excavation must be made in solid rock, from fourteen to eighteen feet under water. It is the intention to furnish fourteen feet of water at all points, except over the mitersills on the levels, where the water has to be raised. Here the depth will be only twelve feet.

The board of Government engineers which was convened to decide on the plans offered by the company which is to build a bridge over the Mississippi at Carondelet, twelve miles below St. Louis, reports that an arched bridge should be prohibited; that the 500 feet spans should be reduced to 450 feet and a draw put in. They propose a bridge with two centre spans of 450 feet each, and fixed side spans of 250 feet, with a draw having two 160 feet openings. The lowest part of the superstructure is to be 100 feet above low water. Two railway tracks, two highway tracks, and two foot paths, each of 8 feet width, are to be provided. No riprap or other protection to foundations is to be allowed. It is plain that the experience with the present St. Louis bridge is not satisfactory to our Government engineers.

Proposals for Contracts.

OLD COURT HOUSE FOR SALE.—Proposals for the purchase of the Old Court House at Springfield. Ill., will be received at the office of the county clerk of Sangamon county, until noon of Thursday, April 18, 1876. George Pickerell, W. M. Warren, J. S. Highmore, *Special Committee.*

Commissioners' Office, Hamilton Co., Ohio,
March 8, 1876.

EMBANKMENT AND APPROACHES.—Sealed proposals will be received at this office until Friday, April 7, 1876, at 12 o'clock m., for making embankment and approaches to the Union Bridge over Little Miami River, between Spencer and Anderson townships. Specifications and profile can be seen at this office. By order of Commissioners. Joseph B. Humphreys, *Auditor.*

By Jas. F. White, Deputy.

Detroit & Milwaukee Railroad,
Receiver's Office, March, 27, 1876.

STEEL RAILS.—Tenders will be received until the 5th day of April, 1876, for the delivery at Grand Haven or Detroit, of five thousand tons, (gross) of First Quality Bessemer Steel Rails, with usual guarantee for five (5) years, two thirds thereof to be thirty feet long and none less than twenty-four feet long, 57½ pounds to the yard delivery at the rate of not less than seven hundred tons, nor more than one thousand tons per month beginning with April and to be completed before November, 1876. Payment to be made as follows: An equal amount of old iron rails to be delivered monthly at the same place where the steel rails are received, and the residue in money on the 10th of the month succeeding the delivery provided the revenue of the line will admit of such payment in money, or if not, the deficiency to be covered by a Receiver's Certificate bearing interest, non-cumulative, from that date, at the rate of seven per cent per annum, in conformity with an order of the Circuit Court of Wayne county, authorizing a contract, and making such deficiency a charge upon the line; a copy of such order to be attached to the contract. C.C. Trowbridge Receiver.

DREDGING.—Proposals in duplicate, addressed to the undersigned, and endorsed "Proposals for dredging at Buffalo, N. Y," are invited. For specifications, all other necessary information, and blank form upon which proposals must be made apply to this office before 12 o'clock noon, Thursday, April 6th, 1876, at which time bids will be opened and award made. C. E. Blunt, Lt. Col. of Engineers.

U. S. Engineer's office, 120 Pearl St., Buffalo, N. Y., March 16, 1876.

IRON WORK.—Proposals will be received by the undersigned at Morrison, up to 12 o'clock m, on Thursday the 20th day of April, 1876, for the construction of 14 iron cells in the Whiteside County (Illinois) Jail, including iron floors, platforms, corridor, gratings, doors and and locks, and other fixtures, in accordance with plans and specifications now on file in the County Clerk's office. By order of special committee. E. W. Payne, County Committee.

STREET IMPROVEMENT.—Proposals will be received at the office of the Board of Improvement until 12 o'clock noon, of Monday, April 24th, 1876, for grading, curbing, flagging gutters, macadamizing the road bed and constructing the necessary culverts, drains or retaining walls on Locust Street, from Mound Street to Main Street in the city of Cincinnati, O., in accordance with specifications on file in the office of the Board of Improvements. Bidders to use the printed forms as no others will be received. By order of the Board. Lewis G. Bennard, Clerk.

SCHOOL BUILDING.—Proposals for the erection of a public school building for the seventh ward, Allegheny, Pa., will be received until Thursday, April 6th, 4 P. M. Plans and specifications can be seen at the office of Barr & Moser, Architects. Proposals to be left with Mr. Edward Foerster, 164 Smithfield Street, Pittsburgh, Pa., or any other member of the Board. *By order of the Board,*

MASONRY AND IRON WORK.—Proposals for the abutments of Hiland Avenue Bridge over Railroad Street at Pittsburgh, Pa., also for furnishing and erecting iron steps and railing at same place will be received at the City Engineer's office where plans and specifications can be seen until April 6th, 1876. W. H. Denniston, John Beecher, Lemuel Spohr, S. F. Stewart, John Liggett, *Commissioners.*

EARTH WORK.—Proposals will be received at the office of the undersigned, in Sedalia, Missouri, until April 10 1876, for filling trestles on the line of the Missouri, Kansas & Texas Railway, between Moberly and Hannibal, Mo.

Bidders will state the price per cubic yard for work done with steam shovel and with scrapers separately. Each bid must be accompanied by a satisfactory bond of $5,000, for the faithful performance of the contract. For further information and facilities to examine the work, applications should be made to this office. S. W. Lee, Resident Engineer.

MASONRY AND IRON WORK.—Proposals will be received by the Board of Commissioners of Monroe Co., Indiana, at the Auditor's office until 1 o'clock, Wednesday, April 26th, 1876, for the building of stone abutments for bridge, and iron fence around the court house square. Plans and specifications can be seen at the Auditor's office. Cash payments. James F. Manley, Auditor Monroe County.

HEATING APPARATUS.—Proposals addressed to the undersigned, will be received at this office, until the 8th day of April, inclusive, for the construction and fitting up of a heating apparatus at the Quebec jail. The plans and specificationa of the work may be seen at this office every day between the hours of 10 a. m. and 4 p. m. By order; E. Moreau, Secretary. Department of Agriculture and Public Works.

Quebec, Canada, March 23d, 1876.

IRON TRUSS BRIDGE.—Sealed proposals will be received by the Commissioners of Cass County, Indiana, at their office in Logansport, Indiana, until 12 o'clock, noon, on the 20th day of April, 1876, for the erection of a Wrought Iron Truss Bridge, over Eel river, at the North end of Sixth street, in the city of Logansport. Said bridge to have two spans, one span 110 feet and one span 112 feet extreme lengths, with one roadway 20 feet clear width, and two footways 6 feet clear width each; to have 3-inch oak floor on roadways and 2-inch pine floors on footways, with all oak joists. The bridge to have iron floor beams and wrought iron footway fences, with posts secured on floor beams. Capacity of bridge to be 100 lbs. per square foot of roadway, and 60 lbs. per square foot of footways, exclusive of bridge weight. No iron to be strained over 13,000 lbs. per square inch in tension, 8,000 lbs. per square inch in shearing, and 9,000 lbs. per square inch in Gordon's formula for compression strains. Builders must furnish full plans and detailed specifications, giving forms and dimensions of girders, size of each part of bridge, together with strain sheets, giving weight of bridge with maximum strains under the specified load, and the cross-section of each principal part in square inches. Bids to be made per lineal foot for extreme length of superstructure. Proposals not in accordance with this advertisement will not be considered, and the right is reserved to reject any and all bids. John Hynes, Dennis Uhl, Daniel Foglesong, *Board of Commissioners, Cass County.*

JAIL.—Plans and specifications for a jail to be built at Troy, Missouri, are called for, the same to be submitted to the Court in Troy on the 10th of April, 1876. The general plan of said jail to be two stories in height of brick, with four medium sized cells in the second story, and two offices in the lower story, one room for insane, and also two rooms for jailer's residence, and the total cost thereof not to exceed $10,000; the Court to select the plan and submit the building of said jail in accordance with said plan to competition.

Wm. A. Woodson, *Clerk of the County Court.*

SCHOOL HOUSE.—Sealed proposals will be received at the office of the Clerk of the Board of Education of Northampton Township, Summit County, Ohio, until 12 o'clock at noon, on the seventeenth day of April 1876, for building a School House on the lot situated in Sub-district No. 1, according to the plans and specifications on file in said office.

By order of the Board of Education,
H. A. PACKARD, *Clerk.*

Office of Township Clerk of Bedford.

SCHOOL HOUSE.—Sealed proposals will be received by the undersigned at the office of the Township Clerk, until 12 o'clock noon of April 17th, 1876, for the construction of a brick school house in sub-district No. 1. James A. Black, George Long, Osro Osborn, *Committee on Buildings.*

Bedford, Ohio, March 13, 1876.

O. B. GREEN, *Pres.* THOS. BURGESS, *Supt.*
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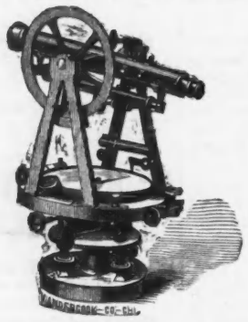

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